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10/693,545	10/23/2003	Jung-Im Kim	3364P140	3620

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EXAMINER

LAMARRE, GUY J

ART UNIT	PAPER NUMBER
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2133

DATE MAILED: 06/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/693,545	Applicant(s) KIM ET AL.	
	Examiner Guy J. Lamarre	Art Unit 2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 October 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>23 October 2003</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

- * The Examiner has considered the Applicant's IDS of 23 October 2003.
- * Pursuant to 35 USC 131, **Claims 1-20** are presented for examination.

Drawings

1. The Drawings are objected to because Figure 1, referred to as conventional in the specification, have not been labeled as prior art. Appropriate correction is required.

Claim Rejections - 35 USC ' 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

.0 This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

.1 **Claims 1-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Applicants' Admitted prior art** (hereinafter **Admitted prior art**) in view of **Shen** (US Patent No. 6686853; filed Nov. 6, 2000).

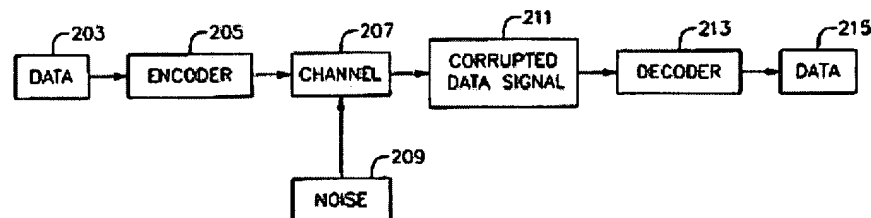
As per **Claims 1, 5, 11, 14, Admitted prior art** substantially discloses, in Fig. 1 and related description on page 5 line 2 et seq., encoding apparatus and related decoding system thereof, for encoding input information data using TURBO codes and transmitting encoded data to a decoding apparatus in a hybrid automatic repeat request system, the encoding apparatus comprising: a first TURBO code encoder for performing TURBO code encoding on the input information data and transmitting the encoded data to the decoding apparatus; an interleaver for interleaving the input information data; and a second TURBO code encoder arranged in parallel

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with the first TURBO code encoder, for performing TURBO code encoding on an output of the interleaver, wherein the first TURBO code encoder transmits an output signal to the decoding apparatus at odd numbered retransmissions in response to a retransmission request from the decoding apparatus, and the second TURBO code encoder transmits an output signal to the decoding apparatus at even numbered retransmissions in response to the retransmission request from the decoding apparatus.

Not specifically described in detail in **Admitted prior art** is the step whereby turbo coding can be replaced by LDPC (low density parity check) coding.

However, **Shen**, in an analogous art, discloses algorithms wherein such code substitution techniques are described. {See **Shen**, Id., Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq.}

FIG. 2

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the procedure of the **Admitted prior art** by including therein code substitution methods as taught by **Shen**, because such modification would provide the procedure disclosed in the **Admitted prior art** with a technique whereby data processing is optimized by ‘as much as 10 dB performance improvement’ via selection of appropriate coding type. {See **Shen**, col. 1 line 30.}

As per Claim 2, **Admitted prior art’s** Fig. 1 and **Shen** at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent encoding apparatus of claim 1, further including an

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encoding controller for controlling the first LDPC code encoder for odd numbered retransmissions and controlling the second LDPC code encoder for even numbered retransmissions, when receiving a retransmission request from the decoding apparatus.

As per Claim 3, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent encoding apparatus of claim 1, wherein the first LDPC code encoder and the second LDPC code encoder have the same generating matrix and parity check matrix.

As per Claim 4, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent encoding apparatus of claim 3, wherein the first and second LDPC code encoders perform retransmission according to a Chase combining scheme in response to the retransmission request from the decoding apparatus.

As per Claim 5, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent decoding apparatus for decoding LDPC code encoded codewords received from an encoding apparatus in a hybrid automatic repeat request system, the decoding apparatus comprising: a first LDPC code decoder and a second LDPC code decoder for performing LDPC code decoding on an LDPC code coded codeword transmitted from the encoding apparatus; an interleaver for interleaving an output of the first LDPC code decoder and outputting the interleaved data to the second LDPC code decoder; and a deinterleaver for deinterleaving an output of the second LDPC code decoder and outputting the deinterleaved data to the first LDPC code decoder, wherein the first LDPC code decoder performs decoding on the codeword newly received from the encoding apparatus and an odd numbered codeword retransmitted from the encoding apparatus due to a transmission error, the second LDPC code decoder performs decoding on an even numbered codeword retransmitted from the encoding apparatus due to a transmission error, the codeword newly transmitted from

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the encoding apparatus is processed and then finally outputted from the first LDPC code decoder, and the codeword retransmitted from the encoding apparatus is processed and then finally outputted from the deinterleaver.

As per Claim 6, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent decoding apparatus of claim 5, further including: a CRC (cyclic redundancy code) check unit for performing CRC checking on the outputs of the first and the second LDPC code decoders; and a decoding controller for determining whether or not the decoding is successful according to a result of the CRC checking, feeding back a checking result to the encoding apparatus, and controlling the first and second LDPC code decoders to receive the newly transmitted codeword and retransmitted codeword and perform decoding on them.

As per Claim 7, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent decoding apparatus of claim 5, wherein the first LDPC code decoder performs decoding on the odd numbered retransmitted codeword using the output of the deinterleaver.

As per Claim 8, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent decoding apparatus of claim 5, wherein the second LDPC code decoder performs decoding on the even numbered retransmitted codeword using the output of the interleaver.

As per Claim 9, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent decoding apparatus of claim 5, wherein when the retransmission is requested due to a CRC check failure on the output of the first LDPC code decoder, the second LDPC code decoder receives an even numbered retransmitted codeword from the encoding apparatus.

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As per Claim 10, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent decoding apparatus of claim 5, wherein when the retransmission is requested due to a CRC check failure on the output of the second LDPC code decoder, the first LDPC code decoder receives an odd numbered retransmitted codeword from the encoding apparatus.

As per Claim 11, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent encoding apparatus for encoding input information data using LDPC (low density parity check) codes and transmitting encoded data to a decoding apparatus in a hybrid automatic repeat request system, the encoding apparatus comprising: a first LDPC code encoder for performing LDPC code encoding on the input information data and transmitting the encoded data to the decoding apparatus; an interleaver for interleaving the output of the first LDPC code encoder; and a second LDPC code encoder connected in series with the first LDPC code encoder, for performing encoding on an output of the interleaver, and transmitting encoded data to the decoding apparatus; wherein the first LDPC code encoder performs an odd numbered retransmission on the input information data according to a retransmission request from the decoding apparatus; the second LDPC code encoder performs an even numbered retransmission on the input information data according to the retransmission request from the decoding apparatus; and the codeword transmitted by the encoding apparatus is finally output by the first LDPC code decoder.

As per Claim 12, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent encoding apparatus of claim 11, further comprising an encoding controller for controlling the first LDPC code encoder for odd numbered transmission and controlling the second LDPC code encoder for even numbered transmission when the decoding apparatus requests a retransmission.

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As per Claim 13, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent encoding apparatus of claim 11, wherein the first and second LDPC code encoders perform retransmission according to a Chase combining scheme in response to the retransmission request from the decoding apparatus.

As per Claim 14, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent decoding apparatus for decoding codewords, encoded with LDPC codes, received from an encoding apparatus in a hybrid automatic repeat request system, the decoding apparatus comprising: a first LDPC code decoder and a second LDPC code decoder for performing LDPC code decoding on the codeword transmitted from the encoding apparatus; an interleaver for interleaving an output of the first LDPC code decoder and outputting a result to the second LDPC code decoder; and a deinterleaver for deinterleaving the output of the second LDPC code decoder and outputting a result to the first LDPC code decoder, wherein the first LDPC code decoder performs decoding on a codeword newly received from the encoding apparatus and an odd numbered codeword retransmitted from the encoding apparatus due to a transmission error, and the second LDPC code decoder performs decoding on an even numbered codeword retransmitted from the encoding apparatus due to the transmission error.

As per Claim 15, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent decoding apparatus of claim 14, further including: a CRC check unit for performing CRC checking on the output of the first LDPC code decoder; and a decoding controller for determining whether or not the decoding is successful according to a result of the CRC checking, feeding back a checking result to the encoding apparatus, and controlling the first and second LDPC code decoders to receive the newly transmitted codeword and retransmitted codeword and perform decoding on them.

As per Claim 16, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67,

col. 4 lines 1-14 et seq., disclose equivalent decoding apparatus of claim 14, wherein the first LDPC code decoder performs decoding on the odd numbered retransmitted codeword using the output of the deinterleaver.

As per Claim 17, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent decoding apparatus of claim 14, wherein the second LDPC code decoder performs decoding on the even numbered retransmitted codeword using the output of the interleaver.

As per Claim 18, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent decoding apparatus of claim 14, wherein the retransmission request is sent to the encoding apparatus when the output of the first LDPC code decoder fails to pass the CRC checking.

As per Claim 19, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent decoding apparatus of claim 14, wherein when the output of the first LDPC code decoder corresponding to the odd numbered retransmitted codeword fails to pass the CRC checking, the output of the first LDPC code decoder is recursively decoded through the interleaver, the second LDPC code decoder, the deinterleaver, and the first LDPC code decoder.

As per Claim 20, Admitted prior art's Fig. 1 and Shen at Fig. 2 and col. 3 lines 19-26, 65-67, col. 4 lines 1-14 et seq., disclose equivalent decoding apparatus of claim 14, wherein when the output of the first LDPC code decoder corresponding to the even numbered retransmitted codeword, which is processed by the second LDPC code decoder and deinterleaver, fails to pass the CRC checking, the output of the first LDPC code decoder is recursively processed by the interleaver, the second LDPC code decoder, the deinterleaver, and the first LDPC code decoder.

CONCLUSION

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* Any response to this action should be mailed to:

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or faxed to: (571) 273-8300 for all formal communications.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Guy J. Lamarre, P.E., whose telephone number is (571) 272-3826. The examiner can normally be reached on Monday to Friday from 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert De Cady, can be reached at (571) 272-3819.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (571) 272-3609.

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Guy J. Lamarre, P.E
Primary Examiner
6/25/2006
